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Planning to Build A Park and Ride in The Town Square of Bekasi

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Abstract

The need for transportation has now become a very meeting thing for residents of a city. Because transportation is a very important means of smoothing the economy of a region. Along with the growing economy of residents in an area, the number of owners and users of private vehicles has also increased rapidly. That needs to be balanced with supporting transportation support facilities. For that we need a solution to reduce congestion by maximizing the benefits of public transportation such as commuter line trains. One thing that can be done is the construction of a Park and ride building as a transportation support facility at Bekasi Station, Bekasi City. To plan a Park and ride building some data is needed. Data obtained from field surveys, namely surveys to obtain the demand value for the arrival of vehicles. The survey was conducted by counting the number of vehicles leaving and entering the Bekasi station parking lot which is divided into two zones, namely the northern zone and the southern zone. The survey was carried out at 06.00 – 21.00 WIB. In the results of data processing using excel, it is obtained the characteristics of Park and ride facilities users and also the number of users demand for park and ride facilities for motorbikes is 676, while for cars is 107 vehicles. of the total demand, a park and ride building is planned to accommodate 1000 motorbikes and 100 cars with 3 floors.

Keywords :
Bekasi City, Bekasi Statio, Commuter Line, Park and Ride.

1. Introduction

Bekasi City is a partner city for DKI Jakarta, which is currently developing quite rapidly as an urban area, relying on the service and trade sectors. With an area of ± 210.49 km2 and a total population of 3.2 million people (based on the Bekasi Mid-term development plan (RPJMD) 2018-2023) where some of the population is commuter users to DKI Jakarta, the Bekasi city government together with the government DKI Jakarta needs to provide and encourage its citizens to mobilize using mass transportation.

Transportation Demand Management or commonly referred to as Travel Demand Management or travel demand management is a common form of traffic management system using existing ports more efficiently, namely by minimizing the use of motorized vehicles by influencing travel behavior which includes frequency, destination, mode, and traffic. travel time (Tanariboon, 1992) One of the TDM strategies is to shift modes by optimizing the role of mass public transport. Currently, the problem of the role and arrangement of public transportation and public cities in a number of areas is also happening in the city of Bekasi (Djoko Setijowarno, congratulations on mass transportation and representatives of research and advocacy for the Indonesian transportation community)

One of the efforts to increase the role of mass public transportation in the city of Bekasi can be carried out by implementing the concept of Park and ride (parking and driving), which is parking facilities that are usually available at bus stops or terminals for mass public transportation facilities, allowing people to move young from private vehicles (cars and motorbikes) and continue the journey using mass public transportation from that point (Kementrian Negara Lingkungan Hidup, 2009). Several studies have concluded that park and ride facilities can promote the use of public transportation, reduce urban traffic congestion and reduce the level of carbon pollution in the city center (Dijk, M. dan Montalvo, 2011). Provision of park and ride services is an effective means of extending public transport services to low-density areas where commuters can still use their cars to start their journey but change to public transport (transit) at several locations on the same trip (Farhan, 2003)

The provision of park and ride in the city of Bekasi is expected to be able to encourage private vehicle users, especially road users who take commuting trips and their activity areas are in line with mass transportation so that they are able to park their private vehicles at park and ride facilities and continue the trip to DKI Jakarta using mass transportation.

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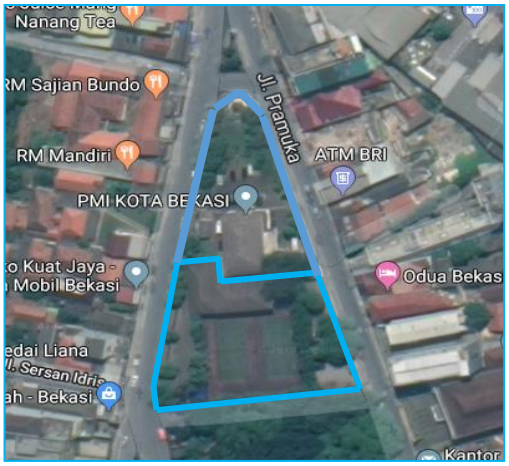

Figure 1. Location Planning Land Park and Ride
Source : personal,2020

2. Methodology

The analysis method used is by using quantitative methods. Where this method consists of several stages, namely the preparation that discusses the preliminary survey, the data collection stage that discusses how to collect data, the analysis stage that discusses the estimated number of vehicles that will use park and ride and the capacity of parking spaces that can be provided and the evaluation and improvement stages.

The data needed in the Park and Ride Development Planning in Bekasi City Square includes secondary data and primary data. Secondary data obtained from the internet, books or planners who will build a park and ride in the Bekasi kta square include:

a. Land Area
b. Location Map
c. Building Plans

Meanwhile, primary data was obtained by conducting direct surveys in the field, including the calculation of data in and out of vehicles at Bekasi city stations and a survey of park and ride user interests using characteristic interviews or questionnaires.

3. Result and Discussion

3.1. Data in and out of the vehicle

The results of the combined parking survey to obtain data in and out of vehicles are:

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Tabel 1. The Number Of In and Out Of The Vehicle

Execution Time	Total In and Out Of The Vehicle					
	Car			Motorcycle		
	Accumulation	in	Out	Accumulation	In	Out
06:00 - 07:00	34	37	3	273	287	14
07:00 - 08:00	57	29	6	489	228	12
08:00 - 09:00	88	37	6	685	218	22
09:00 - 10:00	106	27	9	819	155	21
10:00 - 11:00	131	33	8	952	156	23
11:00 - 12:00	141	26	16	1039	130	43
12:00 - 13:00	141	25	25	1112	119	46
13:00 - 14:00	137	22	26	1102	52	62
14:00 - 15:00	135	22	24	1061	42	83
15:00 - 16:00	125	14	24	974	44	131
16:00 - 17:00	107	15	33	834	36	176
17:00 - 18:00	76	8	39	622	27	239
18:00 - 19:00	57	11	30	410	20	232
19:00 - 20:00	45	6	18	257	12	165
20:00 - 21:00	32	4	17	181	10	86
Jumlah		316	284		1536	1355

Source : result of analysis, 2020

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To clarify the above survey results, it can be seen in the following parking survey fluctuation chart:

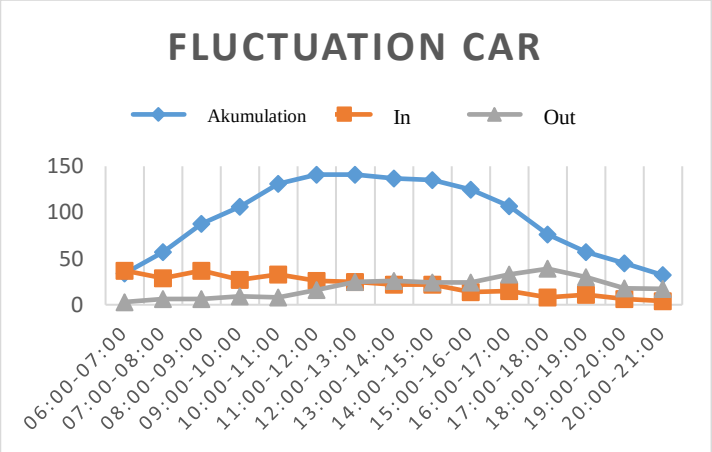

Figure 2. Graph Of Fluctuations In Car Park Bekasi Station
Source : Result Of Analysis2020

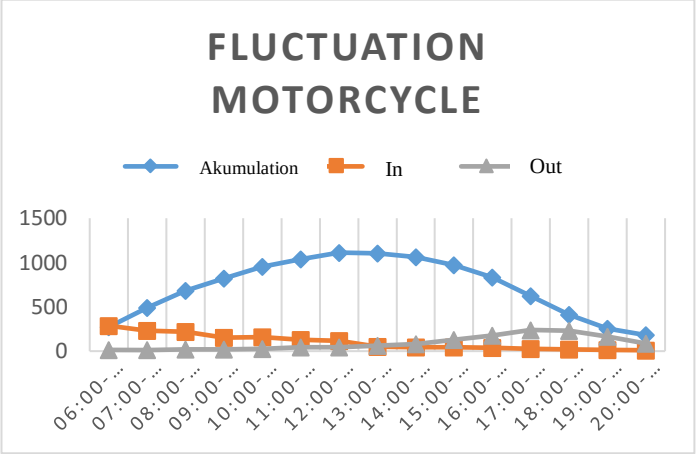

Figure 3. Graph Of Fluctuations In Motorcycle Park Bekasi Station
Source : Result Of Analysis 2020

From the image of the Fluctuation Graph above, it is known that the highest accumulation at Bekasi Station for cars is 141 vehicles and for motorbikes is 1112 vehicles and the highest peak hours occur at 12.00 - 13.00. It is known that the accumulated parking at Bekasi Station is 316 vehicles for cars and 1536 for motorbikes.

3.2. Determination of the Number of Samples

Following are the results of the calculation of the number of respondents using the Slovin formula:

$$n = \frac{1536}{1536.0{,}13^2 + 1} = 57\ samples\ for\ motorcycle$$

With the distribution of 25% direct interviews or about 14 respondents. And 75% of interviews were indirect (online) or about 43 respondents. So the number of samples for motorbikes is 57 respondents.

$$n = \frac{316}{316.0{,}13^2 + 1} = 50\ samples\ for\ car$$

With the distribution of 25% direct interviews or about 12 respondents. And 75% of the interviews were indirect (online) or about 38 respondents. So the number of samples for cars is 50 respondents.

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3.3. Results of the Questionnaire Survey for Prospective Park and Ride Users

3.3.1. Based on Gender

a. Motorcylce

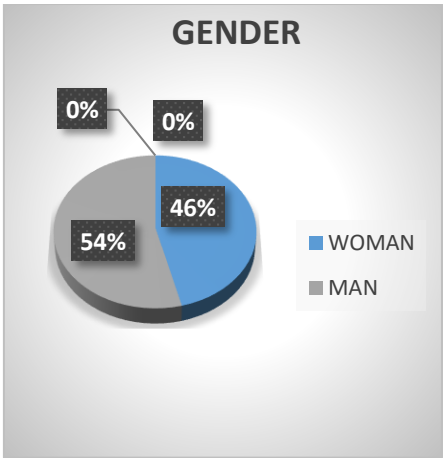

Figure 4. Graph of motorbike users by gender
Source : Result of Analysis 2020

b. Car

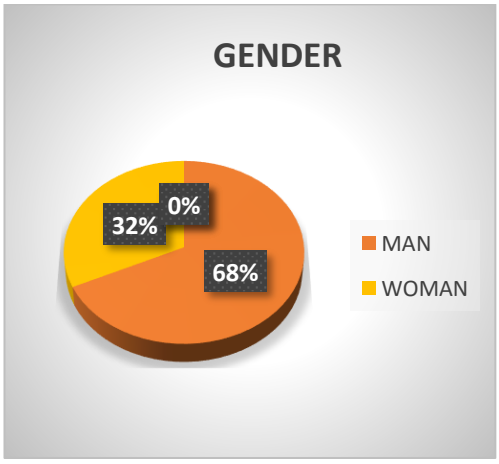

Figure 5. Graph of car users by gender
Source : Result of Analysis 2020

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3.3.2. Based on Age

a. Motorcycle

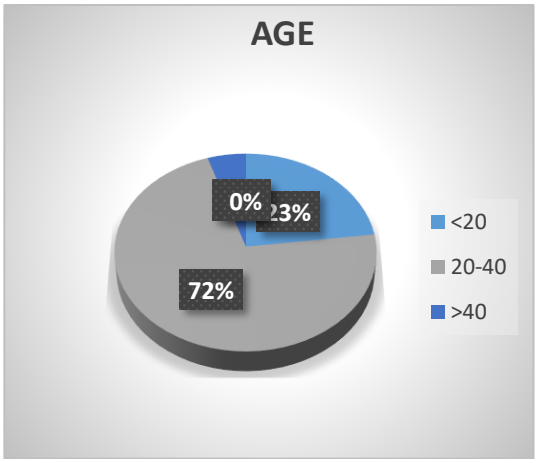

Figure 6. Graph of motorbike users by age
Source : Result of Analysis 2020

b. Car

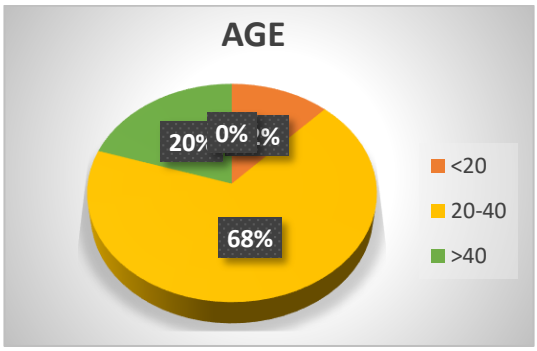

Figure 7. Graph of car users by age
Source : Result of Analysis 2020

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3.3.3. Based on The Duration Of The Trip From Home To The Station

a. Motorcycle

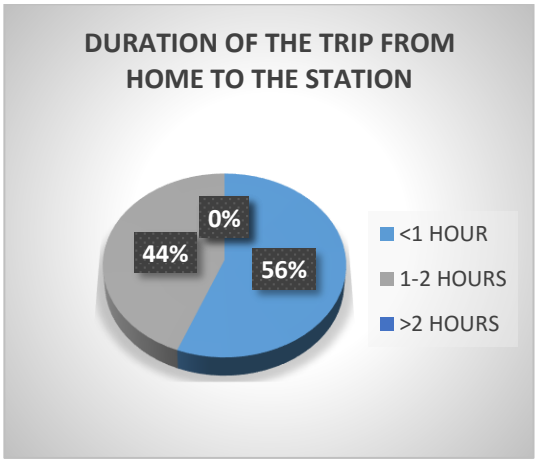

Figure 8. Graph of motorbike users based on the duration of the trip from home to the station
Source : Result of Analysis 2020

b. Car

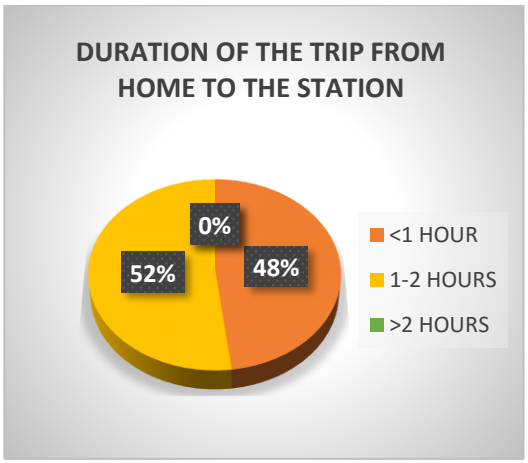

Figure 9. Graph of car users based on the duration of the trip from home to the station
Source : Result of Analysis 2020

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3.3.4. Based On The Purpose Of The Trip

a. Motorcycle

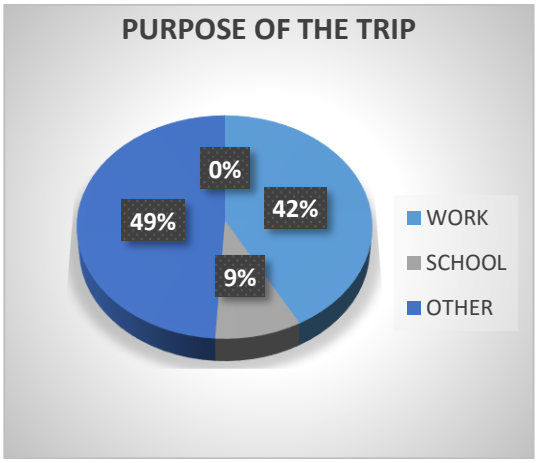

Figure 10. Graph of motorbike users based on travel intent
Source : Result of Analysis 2020

b. Car

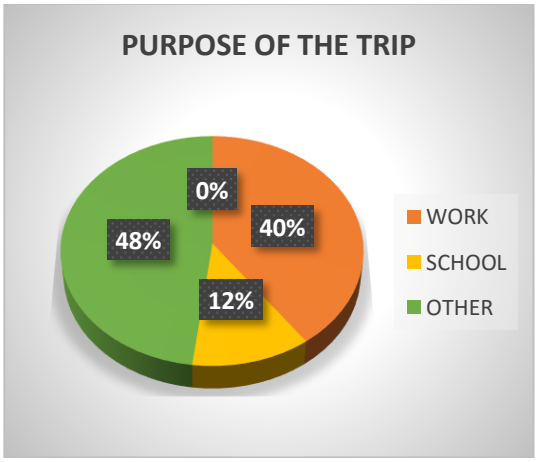

Figure 11. Graph of Car users based on travel intent
Source : Result of Analysis 2020

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3.3.5. Based On The Average Parking Duration Per Day

a. Motorcycle

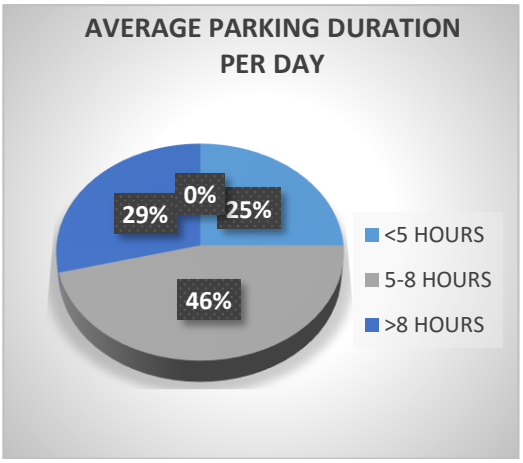

Figure 12. Graph of motorbike users based on average parking duration per day
Source : Result of Analysis 2020

b. Car

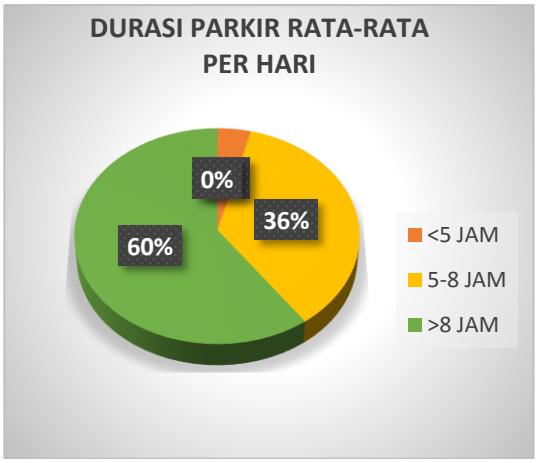

Figure 13. Graph of car users based on average parking duration per day
Source : Result of Analysis 2020

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3.3.6. Based On Monthly Fuel Expenditure

a. Motorcycle

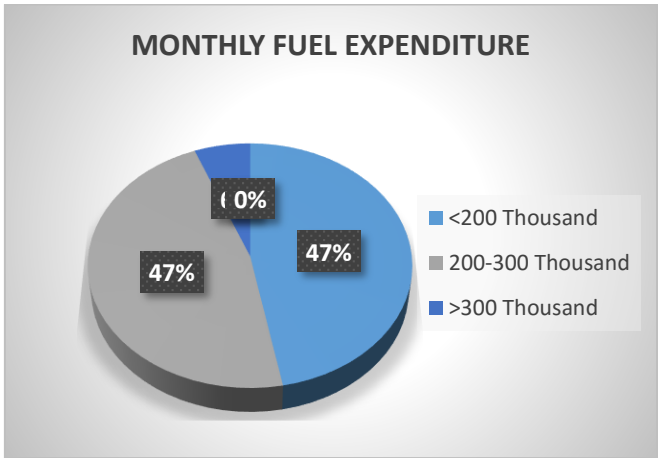

Figure 14. Graph of motorcycle users based on monthly fuel expenditure
Source : Result of Analysis 2020

b. Car

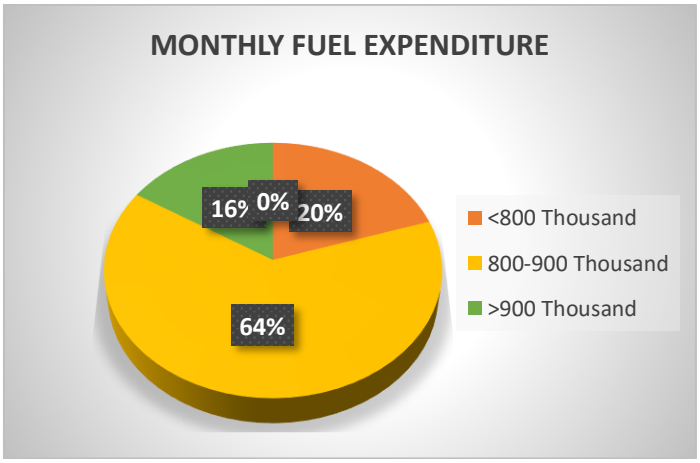

Figure 15. Graph of car users based on monthly fuel expenditure
Source : Result of Analysis 2020

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3.3.7. Number Of Park And Ride Users

a. Motorcycle

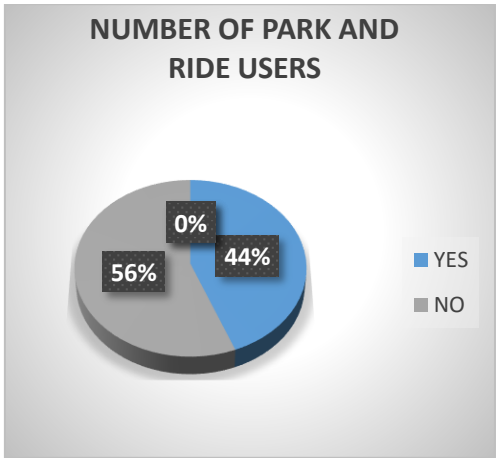

Figure 16. Graph of motorbike users who are willing to use park and ride
Source : Result of Analysis 2020

b. Car

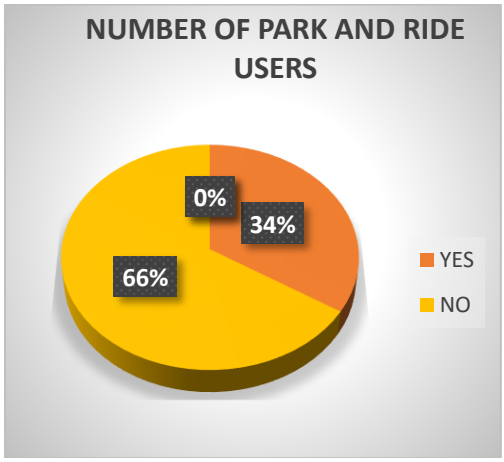

Figure 17. Graph of car users who are willing to use park and ride
Source : Result of Analysis 2020

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3.3.8. The Parking Trif To Be Desired

a. Motorcycle

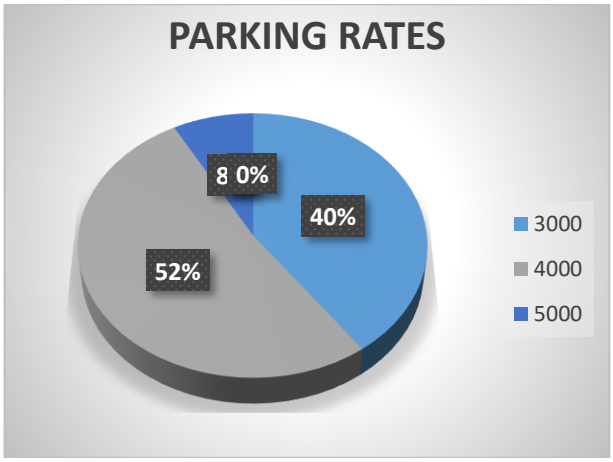

Figure 18. Graph of motorbike users based on the desire parking rate
Source : Result of Analysis 2020

b. Car

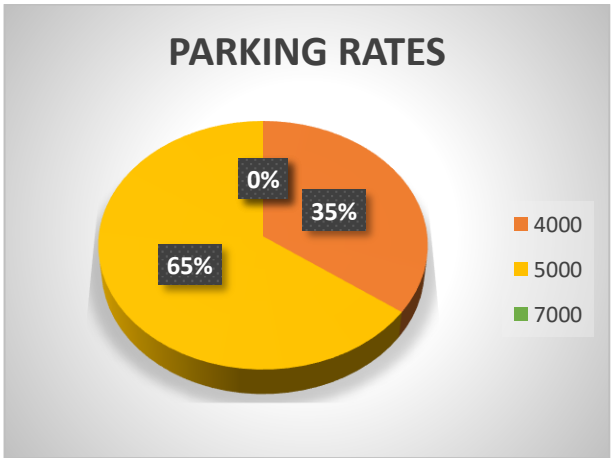

Figure 19. Graph of Car users based on the desire parking rate
Source : Result of Analysis 2020

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3.4. Demand Analysis

Demand calculations are done using survey data interview as a sample and data in and out of vehicles as a population.

Table 2. The results of the calculation of the demand analysis for car users are as follows:

No	Varian Demand	Persentase	Demand	Biggest Possibility	Smallest Possibility
1	Absolute	34%	107	120	93
2	Parking Rates Rp.4000,-	12%	38	43	33
3	Parking Rates Rp.5000,-	22%	70	79	61
4	Parking Rates Rp.7000,-	0	0	0	0

Table 3. The results of the calculation of the demand analysis for motorbike users are as follows:

No	Varian Demand	Persentase	Demand	Biggest Possibility	Smallest Possibility
1	Absolute	44%	676	764	588
2	Parking Rates Rp.3000,-	17%	261	295	227
3	Parking Rates Rp.4000,-	22%	338	382	294
4	Parking RatesRp.5000,-	3%	46	52	40

4. Conclusion

After analyzing calculations and planning, conclusions are drawn that are in accordance with the objectives in this final project. The following is a description of the conclusions that can be drawn from this analysis, namely as follows:

1. From the results of the analysis obtained through interviews, the probability percentage of people who will use the park and ride in the Bekasi city square is as follows:
   a. Percentage of motorcyclists : 34%
   b. Percentage of car driver : 44%
2. From the results of the analysis obtained through interviews, the characteristics of potential park and ride users in the Bekasi city square are also obtained as follows:
   a. Characteristics of motorcycle users
      1. Gender
         Man : 54%
         Woman : 46%
      2. Age
         < 20 Years : 23%
         20 – 40 Years : 72%
         > 40 Years : 5%
      3. Travel Duration from home to Bekasi station

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< 1 Hour : 56%
1 – 2 Hours : 44%
> 2 Hours : -

4. Purpose the trip
   Work : 42%
   School : 9%
   Other : 49%
5. Parking Duration
   < 5 Hours : 25%
   5 – 8 Hours : 46%
   > 8 Hours : 29%
6. Monthly Fuel Expenditure
   < 200.000 : 47%
   200.0 – 300.000 : 47%
   201.0 > 300.000 : 6%
7. Desired Parking Rate Per 1x Parking (Only people interested in using park and ride facilities)
   Rp.3000,- : 40%
   Rp.4000,- : 52%
   Rp.5000,- : 8%

b. Characteristics of car users
   1. Gender
      Man : 68%
      Woman : 32%
   2. Age
      < 20 Years : 12%
      20 – 40 Years : 68%
      > 40 Years : 20%
   3. Travel Duration from home to Bekasi station
      < 1 Hour : 48%
      1 – 2 Hours : 52%
      > 2 Hours : -
   4. Purpose the trip
      Work : 40%
      School : 12%
      Other : 48%
   5. Parking Duration
      < 5 Hours : 4%
      5 – 8 Hours : 36%
      > 8 Hours : 60%
   6. Monthly Fuel Expenditure
      < 800.000 : 20%
      800.0 – 900.000 : 64%
      801.0 > 900.000 : 16%
   7. Desired Parking Rate Per 1x Parking (Only people interested in using park and ride facilities
      Rp.4000,- : 35%
      Rp.5000,- : 65%
      Rp.7000,- : -

3. From the calculation of the survey results, it is found that the demand for park and ride users is calculated based on the survey results and the desired parking rate, the following are the results of the calculation:
   a. The demand for car users who will use the park and ride is 107 vehicles. With the smallest possible 93 vehicles and the largest possible 120 vehicles.
   b. The demand for car users who will use park and ride with an assumption of Rp. 4000.00 is 38 vehicles. With the smallest possible 33 vehicles and the largest possible 43 vehicles.
   c. The demand for car users who will use park and ride with the assumption that the cost of Rp. 5,000 is 70 vehicles. With the smallest possible 61 vehicles and the largest possible 79 vehicles.
   d. The demand for motorbike users who will use the park and ride is 676 vehicles. With the smallest possible 588 vehicles and the largest possible 764 vehicles.
   e. The demand for motorbike users who will use the park and ride with an assumption of Rp. 3000.00 is 261 vehicles. With the smallest possible 227 vehicles and the largest possible 295 vehicles.

f. The demand for motorbike users who will use the park and ride with an assumption of Rp. 4000.00 is 338 vehicles. With the smallest possible 294 vehicles and the largest possible 382 vehicles.
g. The demand for motorbike users who will use the park and ride with an assumption of Rp. 5,000 is 46 vehicles. With the smallest possible 40 vehicles and the largest possible 52 vehicles.

4. From the parking space design, you can get 1000 SRP for motorbikes as many as 2 floors. And for cars, you can get 100 SRP for 1 floor.

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Biography / Biographies

Muhammad Isradi, ST, MT, IPM served as Secretary of the Civil Engineering Study Program at Mercu Buana University. Mr. Isradi holds a Bachelor's degree in Civil Engineering from the University of Muhammadiyah Malang in 1992-1998, with the title of the thesis of One-Way Flat Plate Planning at the Ratu Plaza Madiun Building and a Masters in Civil Engineering in Brawijaya University of Malang in 1999-2001, with the title Model Analysis of Family Movement Awakening in Malang Sawojajar Housing Area. He has taught courses in Road Pavement Planning, Road Geometric Planning, Transportation Engineering, and Environmental Engineering.

Rana Reza Vahira is a student from Mercu Buana University, Kranggan with a Civil Engineering study program. I am the first child of 3 siblings who graduated from SDN Batu Ampar 05 pagi, then moved to SMPN 20 Jakarta,SMAN 7 Depok , until then I continued my education at Mercu Buana Kranggan University. During Junior high school and high school I was active in Paskibra, Dancing, and often participated in several district level competition. And several times participated in math and science competitions at that time. After graduating from high school, I took advantage of my spare time to become a photo model for several distribution brands at that time. For about 1 year I was in this world until entering busy lectures in semester 2.When I entered the educatione level as a student at Mercu Buana, I was active in student activities as a team leader at every ocassion on campus for 3,5 years. And I have participated in a vocal group competition between university in Indonesian University.